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Before the
Federal Communications Commission
Washington DC 20554

In the Matter of

Sutron Corporation,
Request for Waiver of Section 15.250
of the Commission's Rules

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No. _____

REQUEST FOR WAIVER

January 3, 2011

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Before the
Federal Communications Commission
Washington DC 20554

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)	
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REQUEST FOR WAIVER

Sutron Corporation requests a waiver of Section 15.250 of the Commission's Rules so as to permit its Radar Level Recorder to operate over the frequency range 5460-7250 MHz and to use fixed infrastructure.

A. SUMMARY

Sutron manufactures a radar device for measuring water levels from above. Units are mounted under bridges or on pilings or piers above the water, looking straight down. Typical sites are rivers, streams, reservoirs, lakes, estuaries, and tidal areas. Data from the devices help to protect against floods and drought, manage water resources, and support research into climate change.

The device complies in full with Section 15.250, except that it will operate over the range 5460-7250 MHz and requires fixed mounting. Sutron currently markets an otherwise similar device that operates within the Section 15.250 frequency boundaries of 5925-7250 MHz.¹ While excellent for some purposes, it has limited accuracy. Sutron requests the wider bandwidth in order to provide higher accuracy for those applications that need it.

The downward-aimed antenna is highly directional with a 17 dBi gain. Horizontal average emissions are very low at -70.8 dBm EIRP (83 trillionths of a watt).

¹ FCC ID HDBRLR-0003-1.

Expansion of the operating band by the inclusion of 5460-5925 MHz does not encroach on any restricted bands. Given the realities of Sutron installation and operation, harmful interference to other users is effectively impossible.

The prohibition against fixed infrastructure in Section 15.250 is meant to prevent the development of wide-area communications systems. Because the Sutron devices cannot intercommunicate, they cannot form such a system, and so grant of the requested waiver does not undermine the purpose of the rule.

The waiver easily meets the legal standards set out in *Wait Radio v. FCC*. In view of important needs the waived equipment will meet, and the lack of any harm, the waiver is in the public interest and should be granted.

B. ABOUT SUTRON CORPORATION

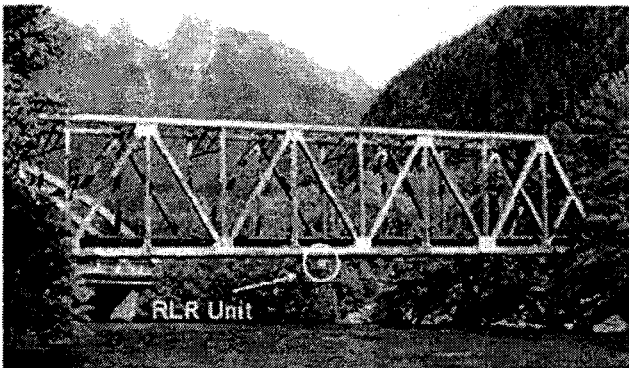
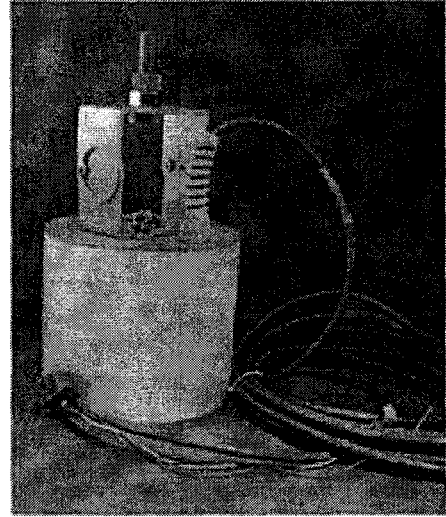
Sutron is the world leader in providing real-time hydrologic, meteorological, and oceanic monitoring and control systems, stations, software, and services. The company's products collect, store, transmit, and host real-time data gathered from extreme and remote sites. Using state-of-the-art communications, Sutron's systems transmit monitored data directly to customers anywhere on the planet to help monitor, control, manage, model, and forecast in the areas of hydrology, meteorology, coastal and storm surge monitoring, and water resource management.

Since 1975, Sutron has sold over 50,000 remote monitoring stations throughout the world. Sutron is a major supplier of equipment and systems to the National Weather Service, National Oceanic Service, U.S. Geological Survey, U.S. Army Corps of Engineers, and Bureau of Reclamation, in addition to many state and local governments and private sector interests.

C. ABOUT SUTRON'S RADAR LEVEL RECORDER

The Sutron Radar Level Recorder (RLR)

monitors water levels in rivers, streams, reservoirs, lakes, estuaries, and tidal areas. The typical installation places the RLR 1.5 meters (5 feet) over the highest expected water level. The RLR is pointed straight down toward the water surface and measures the return time of emissions reflected from the water surface. Units can be installed under bridges or on other existing structures near or over the water. Since the device does not contact the water or have any components in the water, it is minimally invasive of the environment and able to survive extreme conditions. Accuracy is very high, as required for most government programs.



The use of radar solves problems common to older measurement technologies. Conventional water level measurements either use a device underwater to measure pressure (and hence depth), or record the vertical position of a float on the water surface.

Both approaches are expensive and require environmentally invasive construction. Both also expose sensitive equipment to a demanding environment, require expensive installation and maintenance, and are subject to loss or damage due to freezing, flooding, or storms. Some users

have experimented with ultrasonic sensors as an alternative, but these cannot achieve the needed accuracy, and are adversely affected by daily and seasonal temperature changes. The RLR offers high precision and low maintenance with none of the disadvantages of the older technologies.

1. Public interest

Water level data from the RLR directly advances the following benefits:

- minimizing loss of life and property due to water-related natural events, such as floods, droughts, and land movement;
- effectively managing ground-water and surface-water resources for domestic, agricultural, commercial, industrial, recreational, and ecological uses;
- protecting and enhancing water resources for human health, health of aquatic plants and animals, and environmental quality;
- determining U.S. coastal marine boundaries and ensuring the accuracy of nautical charts;
- supporting monitoring activities for climate, tsunami and storm surge events, coastal processes, and tectonic research; and
- contributing to physical and economic development of the Nation's resources for the benefit of present and future generations.

2. Technical description

Frequency usage:	5460-7250 MHz (at -10 dB points)
Average power:	-41.9 dBm EIRP
Peak power:	-3 dBm EIRP (over 50 MHz)
Antenna gain:	17 dBi (directed downward)
Modulation:	1.1nsec burst @ 1.625 MHz repetition rate
Out-of-band emissions:	comply with § 15.250 (subject to waiver)

The use of low power levels into a downward-directed, narrow beamwidth antenna reduces average power in the horizontal direction to an estimated -70.8 dBm EIRP.²

² This estimate relies on manufacturer-provided antenna patterns.

Measurement procedure. The certification test will use direct boresight measurement.

D. REQUEST FOR WAIVER

1. Operating bandwidth

The Sutron device emits a train of pulses that reflect back from the surface being measured. High accuracy requires that pulses be short and sharp. In the frequency domain, narrower pulses correspond to a wider bandwidth. The request here for more bandwidth thus directly supports higher accuracy.

Allocations for the 5460-7250 MHz band are listed in the Appendix. No restricted bands are within this range. There is no appreciable risk of interference to other users.

Most emissions from the device are directed downward into water. The reflected fraction of that energy is almost entirely straight up. Horizontal emissions are -70.8 dBm EIRP, equivalent to 83 *picowatts*.³ These are not continuous. Measurements are typically at intervals of fifteen minutes, on a low duty cycle. Moreover, the emissions occur a few meters above natural water levels, which are the lowest point in a region. To reach a victim receiver, the signal typically would have to penetrate considerable terrain and ground clutter, which exhibit high attenuation at these frequencies.

Usually only one RLR is installed in any part of a stream, lake, or other body of water. Most are installed in remote areas. Units are typically many kilometers apart, thus ruling out signal aggregation.⁴

In short, the realistic likelihood of any significant signal reaching a victim receiver is

³ In other words, 0.083 billionths of a Watt.

⁴ As noted in Part F, below, Sutron will keep records of the installed locations of all waived devices.

extremely slight. Actual interference is far more probable from a compliant Section 15.250 device, whose horizontal emissions can run hundreds of times higher.

The Appendix shows an allocation at 5470-5650 MHz for maritime radionavigation. We understand that most vessels today rely instead on GPS. But if harmful interference into maritime radionavigation systems is nonetheless a concern, Sutron will agree not to install waived units in navigable waterways.

2. Fixed infrastructure

Section 15.250(c) prohibits “fixed outdoor infrastructure.” The prohibition first arose in the original ultra-wideband (UWB) rulemaking, where it applied to “hand held” communications devices. The Commission said:

[W]e remain concerned that permitting UWB devices to be used outdoors could result in the development of large communications systems that could adversely impact the authorized services. For that reason, we are prohibiting the use of antennas attached to outside structures or any form of fixed outdoor infrastructure.⁵

A year later, the Commission sought comment on (among other things) proposals to rescind the minimum bandwidth for UWB operation, allow certain non-UWB transmitters to use UWB methods for measuring peak power; and expand permitted outdoor UWB applications over the 3.1-10.6 GHz range.⁶ Commenting on the last of these, the National Telecommunications and Information Administration (NTIA) said:

If the Commission adopts the UWB hand-held emission limits there is no technical reason to limit further the UWB device applications, *as long as*

⁵ *Ultra-Wideband Transmission Systems*, First Report and Order, 17 FCC Rcd 7435 at ¶ 199 (2002). The prohibition appears at 47 C.F.R. § 15.519(a)(2).

⁶ *Ultra-Wideband Transmission Systems*, Memorandum Opinion and Order and Further Notice of Proposed Rule Making, 18 FCC Rcd 3857 at ¶¶ 155,162-165,166 (2003).

*the Commission retains the current restrictions on fixed outdoor infrastructures*⁷

The Commission ultimately left the UWB rules substantively unchanged. But it implemented the above three proposals in a new Section 15.250, limited to 5925-7250 MHz. In so doing, the Commission acquiesced to NTIA:

While we do not believe that the power levels being permitted in the 5925-7250 MHz band are sufficient to permit the establishment of wide-area communication systems, we also want to ensure that such systems cannot develop until greater experience is gained with unlicensed operation in this band. To ensure that this does not occur, as requested by NTIA we are prohibiting the use of fixed outdoor infrastructures in the 5925-7250 MHz band⁸

In short, the Commission's sole rationale in prohibiting fixed infrastructure is to prevent the emergence of wide-area communications systems. The Sutron devices operate independently, and are incapable of communicating with one another. There is no possibility of their forming a fixed network. A grant of the waiver thus will not undermine the purpose of the infrastructure rule.

E. WAIVER STANDARDS

The Commission assesses waiver requests according to the standards set out in *WAIT Radio v. FCC*.⁹ In that case, as here, the applicant sought to operate in contravention of the rules

⁷ Comments of the National Telecommunications and Information Administration in ET Docket No. 98-153 at 4-5 (filed Jan. 15, 2004) (emphasis added). The quoted remark was not focused particularly on the 5925-7250 MHz band. NTIA's main concern was interference into GPS frequencies, *id.* at 3-4, which are far removed.

⁸ *Ultra-Wideband Transmission Systems*, Second Report and Order and Second Memorandum Opinion and Order, 19 FCC Rcd 24558 at ¶ 27 (2004).

⁹ 418 F.2d 1153 (D.C. Cir. 1969). See, e.g., 2002 *Biennial Regulatory Review*, 18 FCC Rcd 13620 at ¶ 85 n.130 (2003) (citing *WAIT Radio* as "setting out criteria for waivers of Commission rules.")

while explaining how it would nonetheless accomplish the purpose of the rules.¹⁰ The court required the Commission to consider the request:

[A] general rule, deemed valid because its overall objectives are in the public interest, may not be in the “public interest” if extended to an applicant who proposes a new service that will not undermine the policy, served by the rule, that has been adjudged in the public interest.¹¹

The plain meaning is clear: Waiver is appropriate where the applicant furthers the public interest inherent in the underlying rule. The Sutron RLR device does so here. It will further the public interest in managing water resources and protecting life and property, as detailed above, while protecting against harmful interference as well as (or better than) a compliant device. The requested waiver fits easily into the boundaries drawn by *WAIT Radio*.

The Court of Appeals emphasized the importance of waiver procedures as part of the regulatory scheme:

The agency’s discretion to proceed in difficult areas through general rules is intimately linked to the existence of a safety valve procedure for consideration of an application for exemption based on special circumstances.¹²

Thus, it said, “allegations such as those made by petitioners, stated with clarity and accompanied by supporting data . . . must be given a ‘hard look.’”¹³

¹⁰ WAIT Radio operated an AM broadcast station. It was limited to daylight hours so as to afford protection to “white areas” that had no local service, and that relied on nighttime skywave propagation from another station. WAIT Radio proposed to transmit at night using a directional antenna that would limit its signal in the white areas. *WAIT Radio v. FCC*, 418 F.2d at 1154-55.

¹¹ *WAIT Radio v. FCC*, 418 F.2d at 1157.

¹² *Id.*

¹³ *Id.* (citation footnote omitted).

Here, too, the request fully qualifies. The “safety valve” of the waiver procedure is needed to make available an important tool for safety and environmental monitoring. The requested waiver is in the public interest, not only in terms of benefits to the public, but also in the absence of any likely increase in harmful interference. The request is entitled not only to the “hard look” mandated in *WAIT Radio*, but to a grant of the waiver.

F. PROPOSED WAIVER CONDITIONS

Sutron proposes the following conditions on a grant of the requested waiver:

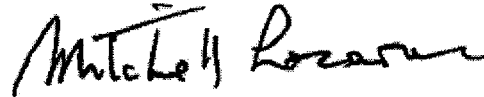
- Sales of the RLR under the waiver will be limited to federal, state and local government agencies, power companies, water companies, water conservancy districts, irrigation companies, and companies involved in environmental studies, impact statements, and remediation.
- Sales of waived devices to consumers will be prohibited.
- Sutron will not install units within 35 km of the TDWR radars listed in Memorandum from Julius Knapp and P. Michele Ellison, FCC, to Manufacturers and Operators of Unlicensed 5 GHz Outdoor Network Equipment (July 27, 2010).¹⁴
- If the Commission deems it necessary to prevent harmful interference into maritime radionavigation systems, Sutron will not install waived units in navigable waterways.
- Sutron will keep records of the installed locations of waived devices, and will share that information on request with the Commission and with other agencies of the U.S. Government.
- Operation must cease if harmful interference cannot be corrected.

¹⁴ A copy of the memorandum is posted at:
<http://www.fhhlaw.com/FCC%20Memorandum%20on%20UNII%20Device%20Operation%20July%2027%202010%20-%20M%20.pdf>.

CONCLUSION

Grant of the requested waiver will directly benefit the public. There is no realistic risk of interference to other spectrum users. The waiver is in the public interest and should be granted.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mitchell Lazarus". The signature is fluid and cursive, with the first name "Mitchell" written in a larger, more prominent script than the last name "Lazarus".

Mitchell Lazarus
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January 3, 2011

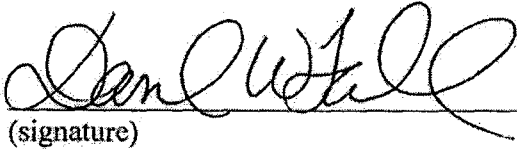
APPENDIX

Sub-Band (GHz)	U.S. Federal	U.S. Non-Federal
5.460-5.470	RADIONAVIGATION EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION	RADIONAVIGATION Earth exploration-satellite (active) Space research (active) Radiolocation
5.470-5.570	MARITIME RADIONAVIGATION EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION	MARITIME RADIONAVIGATION RADIOLOCATION Earth exploration-satellite (active) Space research (active)
5.570-5.600	MARITIME RADIONAVIGATION RADIOLOCATION	MARITIME RADIONAVIGATION RADIOLOCATION
5.600-5.650	MARITIME RADIONAVIGATION METEOROLOGICAL AIDS RADIOLOCATION	MARITIME RADIONAVIGATION METEOROLOGICAL AIDS RADIOLOCATION
5.650-5.830	RADIOLOCATION	Amateur
5.830-5.850		Amateur Amateur-satellite (space-to-Earth)
5.850-5.925		FIXED-SATELLITE (Earth-to-space) MOBILE Amateur
5.925-7.125		(variously) FIXED MOBILE FIXED-SATELLITE (Earth-to-space)

TECHNICAL CERTIFICATION

I am a technically qualified person who reviewed the foregoing "Request for Waiver" of Sutron Corporation.

I certify that the technical statements therein are correct to the best of my knowledge.


(signature)

1/3/2011
(date)

Daniel Farrell
Vice President
Sutron Corporation.

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